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CONTENTS

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VITAMIN STABILITY DURING CANNING

● For over twenty years, intensive studies have been made of the stabilities of the vitamins under various conditions and treatments. Data accumulated indicate that certain vitamins contained in foods may, under specific conditions, be sensitive to oxygen in the presence of heat, or to heat or oxygen alone (1).

Broad details concerning vitamin stabilities are now general knowledge. The basic principle of commercial canning, namely heat sterilization of foods in sealed containers, is also generally known. As a consequence, there has been a tendency in some quarters to regard canned foods as deficient in certain, if not all, vitamins originally present in the raw material because of the conditions to which they were subjected during the canning procedures. Such a concept is not consistent with the established facts.

In future issues it is our intention to review the vitamin values of specific canned foods, as well as other nutritional virtues which they may possess. At this time we should like briefly to survey the matter of the stability of the most widely distributed vitamins during the canning procedure:

In general, vitamin A is not affected by commercial canning. This also appears true of vitamin G, as judged by present bio-assay methods for this complex dietary factor.

The stability of vitamin B_1 is dependent not only upon the heat treatment accorded it, but also upon the natural acidity of the food in which it is contained. In the more acid foods there is practically no loss of the vitamin during canning; in the less acid foods, which require longer and higher sterilization times and temperatures, the degree of retention is not as high.

Vitamin C is the most labile of all the vitamins; it is especially subject to destruction by open pan methods of cooking which permit free contact with atmospheric oxygen. In canning, however, the food is protected to a greater degree from contact with oxygen in the presence of heat; consequently the antiscorbutic factor is well retained in commercially canned foods.

Protective measures employed in commercial canning combine to insure that vitamins are retained in high degree. Such measures include the use of selected raw materials at the optimum state of maturity; prompt handling of the harvested crop; rapid inactivation of enzymes; removal of respiratory oxygen; and exclusion of air to a maximum extent during canning.

A fuller discussion of vitamin stabilities during canning procedures is not possible here. For further reading a recent publication dealing more in detail with this important subject is recommended (2).

(1) The Vitamins, Sherman and Smith, The Chemical Catalog Co., New York, 1931. The Vitamins: Browning, Bailliere, Tindall and Cox, London, 1931. Vitamins, A Survey of Present Knowledge, Medical Research Council, H. M. Stationery Office, London, 1932.

(2) Ind. Eng. Chem. 24, 650 (1932)

The Treatment of EARLY SYPHILIS

THE TREATMENT of early syphilis advocated today involves such basic principles as the use of an arsphenamine as the foundation of the treatment, the use of a heavy metal as an adjuvant (preferably bismuth intramuscularly), and the continuation of treatment without a rest period for a period of one year after all symptoms and signs of the disease have disappeared.

These fundamentals have evolved from a painstaking study, by a group of university clinics in collaboration with the U. S. Public Health Service, of records covering a fifteen year period. Their report may be considered as the most authentic information available today relative to the satisfactory treatment of early syphilis. The method of treatment advocated is known as:—

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RECENT INVESTIGATIONS ON THE PHYSIOLOGY OF GASTRIC SECRETION AND THE RELATION TO CLINICAL MEDICINE*

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Baltimore, Md.

Mr. President and Members of the Society: I wish to present to you today some of the more recent investigations on the physiochemical structure of the gastric juice, and the relation of these studies to clinical medicine.

I would like to start off by painting a background to give some color to the scene upon which we are working. As you well know, the first rough study of gastric juice was done many years ago by Beaumont. He found, through the aid of Alexis St. Martin who had a wound in his stomach wall, that gastric juice was acid, that secretion was produced by different types of stimuli, and that it could be made to appear by psychic stumli; that is, if he simply offered to Alexis a drink of whiskey, gastric juice would appear in the stomach.

Pavlov and his co-workers, in Russia, extended these studies and made fundamental observations of note. They showed that the vagus nerve was the direct controller of secretion; that by stimulation of the vagus they could produce gastric secretion. Following section of the vagus, they were able to show that different effects could be produced on gastric secretion by stimulating the peripheral and central nerve roots of the Vagi.

He was able to show, in animals with gastrostomies and in which the cephalad segment of the sectioned esophagus was fixed to the outside through the neck, that there was such a phenomenon as psychic secretion. When food was offered to such an animal which had a gastrostomy opening in its stomach, it would enter through the mouth and come out of the esophagus, yet during all of this time gastric juice was constantly secreted in the stomach. Therefore, beyond a modicum of doubt, it must be that gastric juice is, in part, controlled by a nervous center.

A great deal of experimentation followed Pavlov's work, particularly in Germany, where more investigations were made on the bio-chemistry of gastric secretion. A good deal of this work was devoted to studies on pepsin, but they were unable to obtain it in pure form.

This work has been carried on in this country by a number of men, of whom no doubt Carlson stands out prominently in your minds both in the physiology and chemistry of gastric secretion. Gamble and McIver did the first detailed meticulous work on the chlorides and the bases of gastric secretion. Michaelis, has worked out the titration curves of gastric secretion, and Northrop has crystallized pepsin, obtained from the gastric mucosa of a cow.

The observations that I wish to bring before you are in supplement of these that I have cursorily outlined, and, with this data in mind, I shall then try to sketch for you some picture of what goes on during gastric secretion.

These data were obtained from individuals who came to the Johns Hopkins Hospital for one reason or another. There were about 150 persons investigated, and the scope of the investigation entailed the determination of such substances as chlorides, hydrochloric acid, phosphates, carbon dioxide, proteins, various non-protein nitrogen constituents. I shall try to present them to you in an orderly manner.

When a tube is placed into the stomach of a fasting individual, the so-called resting juice is found. This juice may or may not con-

*Read before the Medical Society of Delaware, Dover, October 9, 1934.

tain hydrochloric acid and, for the time being, let us put off its description.

Following the injection of histamine, a copious secretion of gastric juice appears in almost all normal individuals, and that gastric juice contains varying amounts of hydrochloric acid.

It is important to determine what happens to other materials, besides hydrochloric acid, in the gastric juice during secretion.

The first figure is produced to show the relation of the so-called fixed bases, such as sodium, magnesium, calcium and potassium (actually present as neutral salts, such as sodium chloride), to hydrochloric acid. As you know, when gastric juice is secreted, the fluid which appears is, when filtered, quite limpid. You will notice on the graduated scale that when there is a great deal of hydrochloric acid, about 120 cc. as you would titrate it, or 120 milli-equivalents, the bases are very low about 30. When the titratable acidity becomes less, the base is increased.

I shall not try to burden you with intricate relationships, but I should like to give some outline, this may be seen in Figure II. In the fasting juice we find, at times, hydrochloric acid, but there are many other ingredients. For the sake of simplicity only a few are shown in the figure. These other fractions, I shall describe later.

In most normal persons, thirty minutes after stimulation, the type of juice is greatly changed. With the increased volume of secretion, hydrochloric acid is present in considerable amounts, and the neutral salt concentration is correspondingly decreased. During this same period, chlorides are increased. This phase of stimulation continues for varying periods of time and, as it wears off, there is a gradual return of the electrolyte pattern to that found in the normal resting juice. This is done without the influence of regurgitated duodenal contents. It is not necessary. The titratable acidity can be influenced by duodenal regurgitation, but this phenomenon is not a prerequisite to normal secretion. If you look at Figure II, you may have a better idea of why this is so. The top row represents the volume of juice secreted, and it is evident that, throughout the period of secretion, the amount of base remains about the same. Only the concentration is decreased. Therefore, it seems probable that the increased titratable acidity, found during the height of secretion, and the gradual decrease are due in the first place to dilution of salts in HC1 and in the second to the dilution of acid by salts. The concentration of acid, as secreted, apparently remains about the same.

The individual who does not secrete hydrochloric acid nevertheless responds in a way to histamine. He usually secretes greater quantities during half-hour post stimulation periods than are found during previous control half-hour periods. He secretes a juice which contains neutral salts, carbonates, phosphates, proteins, and non-protein nitrogen constituents. The secretion level of the salts changes; in other words, salt is not always secreted into an achlorhydric stomach at the same concentration.

There are known to be nitrogenous materials in the gastric juice, and it is possible to precipitate the proteins of the gastric juices much in the same way that we can precipitate the serum proteins. On this water-clear filtrate, obtained at a more acid reaction than that of blood, such substances as ammonia, uric acid, urea, amino acids, the total amount of non-protein nitrogen have been found and quantitated.

The finding of ammonia in the gastric juice brings up a fascinating question: What is the role of ammonia in the gastric juice? The only other place you will find it as a secretory phenomenon is in the urine. Amino acids and uric acid are found in about the same amounts as they are present in the bloodstream, and the non-protein nitrogen is in itself almost the same quantity as that found in the bloodstream.

When we turn from the normal cases to the achlorhydrias, we find a different state of affairs. The non-protein nitrogen in the benign achlorhydric, i. e. the functional achlorhydria of the neurotic, the thyro-toxic goiter, or the gall bladder disease patients, and so on, is about double that of the normal gastric juice.

It is of importance to note that in carcinoma of the stomach associated with achlorhydria these non-protein nitrogen constituents

are increased about four-fold. This is a real diagnostic help in those cases where it is difficult to distinguish a peptic ulcer from a carcinoma of the stomach.

The question, why is ammonia present in gastric juice, may be, to some degree, answered as follows: It is present in the blood at about 0.1 to 0.2 milligrams per cent. In the gastric juice, it is found at about 5 milligrams per cent; in other words, there is about fifty times as much in gastric juice as is in blood. The urea in the bloodstream accounts for almost all of the non-protein nitrogen. The urea found in the gastric juice is very low, around 2 to 4 milligrams per cent. This curious association of a relatively large amount of toxic ammonia and small amount of easily diffusible urea suggested the thought that it might be a wise idea to look for urease in the gastric juice. By setting up different experiments at different range of hydrogen ion concentration it was possible to show that when gastric juice was allowed to digest itself there was an increase of ammonia which could be shown to be directly due to the destruction of the urea of the gastric juice; furthermore, when urea was added, it was possible to demonstrate a quantitative relationship between the breakdown of urea and increase of ammonia.

The precipitation of proteins was mentioned above. We have found that there are at least two protein-like substances in the gastric juice beside the ordinary mucus. One of these proteins has been isolated, crystallized, and called gastro-globulin. The crystals of gastro-globulin are of various shapes, depending upon the method of crystallization.

This protein contains pepsin and urease, so it is presumably the same type of protein that Northrup has isolated from the bovine gastric mucosa.

In addition to this protein, there is another protein-like substance present in the gastric juice, which does not contain pepsin or urease. This, we have been unable to get out in pure form. We know that it is attached to a carbohydrate radicle and that its iso-electric point is about PH 3.5. From the carbohydrates of this protein, two types of osazone have been obtained.

Therefore, now that we have laid out the stepping stones, as it were, let us see what we can build up in the way of a pattern of gastric secretion.

I have charted, in Figure IV, a composite diagram of a normal case of gastric secretion. It shows, in the top row, the electrolytes or the elements found in gastric juice during various phases of secretion. In the second line, it shows those same elements in the bloodstream and in the bottom, in the urine during the same phases of a gastric secretion. Gastric juice, blood and urine were obtained as controls, and then at thirty, sixty, and ninety minutes after injection of histamine. All specimens analyzed by identical procedures.

Let us at first see what happens to the cations, the positively charged ions. After stimulation there is a decrease in the neutral salts or a decrease in base. There is an increase in hydrogen (hydrochloric acid) and a slight decrease in ammonia, which later returns to the initial level.

In the columns representing the anions, i. e. the negatively charged particles, we see that the chlorides increase. It is generally stated, by numerous writers, that chlorides do not increase during gastric secretion. As far as this data is concerned, that is an error; they increase, and they increase considerably. There are very small changes in the phosphates. What carbon dioxide was present in the fasting juice, disappears as soon as hydrochloric acid appears, and the proteins of the gastric juice stay about the same.

Let us consider the complete electrolytic change in a person pouring out gastric juice, the elements of which he is taking from his bloodstream. It would seem logical to believe that there should be changes in the electrolytic balance of the serum. This supposition is born out as follows. There is a slight increase in base because less base is lost to the gastric juice. There is a drop in the amount of blood chlorides. There is a drop in the phosphates. It seems small on the chart but when one pictures the ratio of serum chloride to phosphate, the fall in the latter is seen to be proportional to the former. As chlorides are lost, the excess, or freed, base immediately combines with

CO_2 and one finds an increase in CO_2 capacity. The proteins vary but little, however, they vary inversely to the serum chlorides.

We may now inquire into any urinary variation, all the while remembering that the experimental subject has lost from his serum chloride and phosphorus and has added to his serum base and bicarbonates. In other words, he is in a condition of relative alkalosis, very much the same as a person who has vomited a great deal, similar to the person who has taken large doses of sodium bicarbonate. Therefore, his urine must get rid of an excess amount of base, and must put out relatively less chlorides and less phosphates than it did before. That would seem a reasonable theory and that is exactly what happens.

Among the achlorhydrias, the changes of the electrolyte pattern show definitely smaller changes and the urine is more apt to become acid as the body has not lost chlorides in excess of base in the gastric juice. It was thought that it would be possible to diagnose an achlorhydria if the urine became acid during digestion. That, unfortunately, does not hold true. For, in a certain number of normal cases, the urine became more acid.

We have now before us a broad schema which outlines the changes occurring in the body during gastric secretion, but now, how does it help us in medicine?

Dr. Tomlinson has outlined for you very well and very clearly the ideas or the reasons for doing a gastric analysis. I am biased, I admit it to start out with, but I believe that gastric analysis is done routinely much too often.

There are two things you want to know about gastric hydrochloric acid: First, is it present? Second, is it absent? Suppose you do find a high titratable acid in your gastric juice, what does it mean? It does not diagnose anything. You may have a high titratable acidity in perfectly normal cases. However, there are times when the differential diagnosis between gastric ulcer and carcinoma is questionable. In these instances a high acidity points more toward an ulcer than it does carcinoma, although early carcinomas can have a high acidity. In these cases of carcinoma, the titratable acidity usually get smaller and smaller as time goes on.

Hyperacidity per se is a bad word, as I have said before. Hydrochloric acid is secreted at about the same concentration, at about 0.5 per cent. It varies a little bit, but relatively little, so little that it is of no clinical importance and a much better expression is a hyper-secretion of acid. It may represent an organic pathologic state, or it may not. It may be indicative of obstruction. However, you can show obstruction very easily with your x-ray. In relation to gastric secretion in carcinoma, there are two things which are worth while knowing: 1, You would like to know that acid is either absent or decreasing in that patient. 2, You would like to know the non-protein nitrogen contents of the juice. The juice must be obtained free from blood, or relatively free from it, or else the value of the non-protein nitrogen determinations are vitiated. If one finds in this juice a large amount of ammonia or amino acid, diagnosis leans much more toward carcinoma than it is toward gastric ulcer. We have six cases on record which on this basis we have been able to diagnose as carcinoma rather than gastric ulcer prior to operation.

You may say, "What of it? You are going to operate anyway." True, but this is a defeatist attitude and robs medicine of one of its greatest interests, i. e. the ability to tell the surgeon what he will find. Anyone can go in and tell what is found. If he cannot, the pathologist can.

There is one more point that I would like to develop on the titration of gastric juice. As Dr. Tomlinson has mentioned, the results of titration of gastric juices are usually expressed as free hydrochloric acid and total acidity or combined acidity. We know what we mean by free hydrochloric acid and its titratable end-point is the canary yellow of Topffer's solution. (Some use the end-joint that Michaelis has adopted, which is a salmon-pink. That is of no direct bearing at the present moment.) Beyond this point, this yellow color, which is around PH 3.5 to PH 4.0, we

add phenolphthalein, and titrate up to a pink color. The amount of alkali that is added between these colors is taken as representing the combined acidity of the gastric juice, and as far as I can understand from reading the literature, combined acidity is supposed to represent the amount of acid which is combined with protein.

Now, for a moment, let us pause. Proteins are amphoteric; they can combine with either acids or bases, and to know with which they are combined, one has to know their so-called isoelectric point, that is that point in the acid-base range at which they do not combine with either. On the acid side of this point, their positively charged radicles are available for chemical union; on the alkaline side the negatively charged. It has been mentioned that the isoelectric point of gastric juice proteins is about PH 3.5. It is to this point that the usual titrations for free HC1 are carried. Therefore while titrating to this end point of canary yellow, not only has the free HC1 been determined, but, also, the amount of acid, all the acid which is combined with all the proteins of the gastric juice. In other words, the free hydrochloric acid figures give not only the amount of free hydrochloric acid but also the total combined acidity. The alkali that is added after that point combines as base with the protein and does not in any way measure combined acidity. It really estimates the alkaline combining strength of the gastric juice. In cases of achlorhydria, it has been called HC1 deficit; another misnomer. Therefore, it is misleading to use such an expression as "combined acidity" while using the present method of titration, and what we had much better do in using the usual figures is to say that we find that the combined and free hydrochloric acid is, say, 48, which corresponds to the old figure that was simply given for free hydrochloric acid. This would eliminate the so-called "combined acidity" until we do know what it means. Up to now we have no idea. It may have some connection with various conditions, particularly those found in achlorhydria, but until that time comes it would seem more reasonable to use the one determination.

SOME RECOGNIZED ESSENTIAL DIAGNOSTIC PROCEDURES IN GASTRO-INTESTINAL DISEASE*

ROBERT W. TOMLINSON, M. D.
Wilmington, Del.

The time alloted for this presentation necessitates brevity, eliminating the possibility of any great minutia of detail. Naught that is new, nothing that is bizarre, and only the minimum of imperatively necessary investigative procedure will be mentioned.

HISTORY

A good history, coupled with a rigid cross-examination of a patient is imperative, disclosing other mal-conditions leading to or accompanying the dyspeptic symptoms. In certain decades of life, the incidence of various conditions has a preponderance, and to such, cognizance must be given in evolving diagnoses, thus duodenal ulcer is more common in men between twenty and forty; carcinoma is manifested usually after middle age and like cirrhosis of the liver, affects males more commonly than females; cholecystitis occurs with greatest frequency in middle-aged women. Colonic diverticulitis generally develops after the age of forty; young people are prone to neurotic states, psychic irregularities and dietetic errors.

Effects of occupation merit consideration; nerve strain predisposes to functional disorders; exposure to lead may cause intestinal colic and constipation. Sedentary avocations are productive of intestinal stasis.

Carcinoma may successively be exhibited in various members of a family or in succeeding generations; while syphilis may be a potent productive factor. (1)

STATUS PRAESENS

The subjective symptoms of the patient must be carefully and intimately elicited. Inquiry relative to the existence of abdominal pain, anorexia, bulimia, belching, flatutence, regurgitation, heartburn, nausea, vomiting, dysphagia, jaundice, diarrhea, constipation, other complaints and weight must be made.

PHYSICAL EXAMINATION

I. Familial hypersthenic gastric diathesis is a predisposing cause of duodenal ulcer.

*Read before the Medical Society of Delaware, Dover, October 9, 1934.

II. A wide epigastric angle and broad features are seen in those subject to Addisonian anemia.

III. Hepatic cirrhosis is noted in those of sparse hairiness on chest and abdomen, and with female distribution of pubic hair.

IV. Gall stones tend to develop in people with deep chests, wide subcostal angles, and wide, rounded faces with narrow eyes.

V. Inspection of general appearance of patient accords much information to observant examiner evinced by status of nourishment, condition of hair, pupillary state, color of skin and conjunctivae condition of teeth, mouth, tongue and gums, the blue line of lead poisoning or the pigmentation of Addison's disease, the presence of left supraclavicular lymph gland enlargement in malignant disease of the gastro-intestinal tract, and epitrochlear gland in syphilis. (1)

BLOOD STUDIES

The blood chemistry should be investigated for:

Blood urea nitrogen, which may be increased in: (Kolmer) Poisoning from heavy metals, passive congestion, prolonged and severe vomiting, gastric and duodenal fistulae, severe diarrhea. Decreased in: (Trumper and Cantarow) acute yellow atrophy of the liver; acute toxic hepatic necrosis due, to: phosphorous, arsephenamine, chloroform, carbon tetrachloride, eclampsia, acute hepatic insufficiency, following operative procedures upon the biliary tract.

Blood chlorides—Normally 400 to 500 mgm. per 100 c. c. of blood as sodium chloride, or 570 to 620 mgm. per 100 c. c. of plasma. (Kolmer). Over 600 or under 300 likely to be pathological. Reduced in prolonged vomiting and diarrhea.

Blood cholesterol—Increased in: cholelithiasis and obstructive jaundice. (Kolmer, and Trumper and Cantarow). Decreased in: chronic bacterial infections, syphilis, starvation states, pernicious anemia (Kolmer), acute hepatic disease as: acute yellow atrophy of liver, arsphenamine, carbon tetrachloride and phosphorus poisoning, cholangitis, yellow fever, spirochaetal jaundice, and inanition.

Blood calcium—Reduced in icterus due to precipitation of bile (Kolmer), and tropical and non-tropical sprue (Trumper and Cantarow), and in alkalosis. (T. and C.)

Carbon dioxide—Decreased in acidosis, prolonged vomiting, or diarrhea. (Kolmer). Increased in pyloric and upper intestinal obstruction, and in individuals receiving excessively large doses of alkalies. Test indicated when B. U. N. over 30 mgm.

Serum protein — albumin—globulin—ratio —plasma albumin normal=4.5 to 5.5 gm. per 100 c. c.

Sedimentation of Erythrocytes—(Kolmer). It is not always a special or specific test for any disease and is not in any sense diagnostic.

Wassermann and Kahn—Always of diagnostic significance, if positive.

Blood sugar—Of value as to determining the presence of diabetes and hyperinsulinism.

Blood creatinine—Should be determined if blood urea nitrogen is high; a valuable check on urea nitrogen. Low creatinine in a serious disease gives a favorable prognosis.

Blood uric acid—Abnormal elevation may occur as the result of intestinal obstruction.

Red blood counts—Evidence of anemia, primary or secondary; polycythemia.

Haemoglobin—Decreased in cases of anemia and hemorrhage.

White blood counts—Evidences of leuckemia, myelogenous or lymphatic; or of infection.

Blood platelets—Reduced in anemia.

Clotting—retraction—coagulation time and volume index sometimes should be estimated.

Color and Saturation Index—In secondary anemia they are normal or reduced; in chlorosis they are reduced; and in pernicious anemia they are increased.

Fragility of R. B. C.—Of value in haemolytic jaundice and in chronic obstructive jaundice.

UROBILINOGEN

In conditions of moderate hepatic damage, in complete biliary obstruction, cholangitis, and hemolytic jaundice is an indication of defective hepatic function. In pure hemolytic icterus, although the function of the liver may be unimpaired, it cannot metabolize completely the excessive amounts of bilirubin formed from the increased quantity of bilirubin which passes into the bile.

Urobilin and excessive amounts of urobilinogen are found in the urine in hepatic functional impairment due to portal cirrhosis; and in hepatic disease, as acute and sub-acute yellow atrophy of the liver, arsphenamine hepatitis, other forms of toxic hepatitis, yellow fever, and phosphorous, chloroform and carbon tetrachloride poisoning.

It is frequently observed in the very early and very late stages of catarrhal jaundice, being absent during the stage of complete biliary obstruction. It is also observed in incomplete biliary obstruction.

The occurrence in obstructive jaundice is indicative of incomplete or intermittent obstruction, with concomitant liver damage or biliary tract infection.

Urobilinuria is not pathognomonic of any one morbid condition, its main diagnostic significance being that some bile is entering the intestine and that the functional activity of the liver is either very considerably impaired or that there is infection of the bile ducts. (6)

GASTRIC ANALYSIS

The fractional test meal was introduced particularly by Rehfuss, in 1914, who believed that the study of gastric secretion, extended over a long period of time, would give accurate information as to the function of the stomach in health and disease. In quite a large number of gastric conditions this chemical method is in many ways useful, and sometimes indispensable. It is of great value, not only in diagnosis, but also in treatment and prognosis. Thus, in mechanical dyspepsias, due to pyloric obstruction, benign or malignant, in gross ulcers, after operations, in chronic gastritits, in Addisonian anemia, the chemical examination of gastric contents can rarely be justifiably omitted, and is unquestionably of great help in diagnosis.

Samples are examined for their physical characteristics, their volumes are estimated, their odour and reaction noted, and they are tested for the presence of undigested food, bile, blood, mucus and starch. Then, after filtering, they are subjected to chemical examination for determination of acidity. In special cases, pepsin and chloride estimations are also performed. Lastly in the case of the fasting stomach, the contents are examined microscopically.

It is wise to consider the volume of resting juice, if over 50 c. c., as a sign of statis or hypersecretion.

The presence and amount of free HCL is tested and total acidity is then determined.

There is generally a difference between the curves of free and total acidity of 10 to 15 cc. and they run closely parallel.

Gastric Curves

Normal curves—The apex of the curve is reached at from 60 to 90 minutes after the test meal and a return to within 20 degrees of the fasting acidity occurs in two hours. The apex values average: Free HCL acid 45 to 55, total acidity 55 to 60. This is the most frequent type of curve found in normal individuals, but there is often a wide deviation from this normal contour in otherwise normal people.

Hyperchlorhydria curve—The contour of this curve conforms to the normal curve except that the acid values are much higher. The fasting acidity will be free HCL, acid, 40; total acidity 55 or higher; the apex of the curve will show free hydrochloric acid, 75; total acidity 90 or higher. This type of curve is occasionally found in normal individuals, but more commonly in cases of early or incipient gastric ulcer.

Step ladder curve—Described by Lyon and Best and supposed to be of serious diagnostic import. According to these observers it is only seen in cases of active ulcer, and usually precedes or follows a hemorrhage. The smooth ascent of the curve is broken by drops in both free and total acid unassociated with biliary regurgitation, followed by a rise to a still higher level than that preceding the drop. The actual acid values are usually much above normal in this type of curve.

Extragastric curve—The acid values, instead of starting to recede after 60 to 90 minutes, continue to rise, the last extraction having the highest acid values. This type of curve is very suggestive of pathology—outside of the stomach—duodenal ulcer, appendicitis, and sigmoiditis are the more common diseases associated with this curve. In duodenal ulcer, appendicitis, and early in the course of chole-

cystitis the acid values are apt to be above normal.

Delayed digestive curve—Is also sometimes called psychic achylia. There is a primary small rise followed by a drop, the acid values remaining very low until 60 to 70 minutes after the meal, when the acid again rises and goes through a normal curve. The primary rise probably represents the psychic secretion, and the secondary rise the hormonic. The latter is delayed in appearance.

Hypochlorhydria curve—May be benign or due to carcinoma of the stomach. There may be no free HCL acid or but small amounts, being under 40, throughout the two hours. The total acidity is low, being under 40, or reaching about 40 toward the end of the first hour. (1) (2) (3) (4) (5) (6) (7)

Lactic and Other Organic Acids

These are to be tested for especially in cases of low acidity, or if there are indications of stagnation and fermentation. It is not pathognomonic of gastric cancer. It may be present in non-malignant as well as in malignant cases, whenever there is food retention occurring under conditions of very low acidity.

Peptic Activity of Gastric Contents

Normally, the stomach secretes two enzymes, pepsin and rennin; they need only be looked for, if there is achlorhydria.

Histamine

It is used to differentiate true from false achylia; in true gastric anacidity, it does not produce free HCL secretion (because of an inborn error of secretion or degeneration of the gastric secretory glands); in false or functional achylia it stimulates the mucus membrane to secrete not only acid, but some pepsin as well. In constitutional achylia and in achylia following an atrophic gastritis, no acid is secreted after the injection. In false achylia, on the other hand, acid is secreted after the stimulation. (1)

Neutral Red

Injection of 4 to 5 c. c. of a 1% aqueous solution of neutral red, intramuscularly, if dye is normally secreted by gastric mucosa, the juice becomes red in 15 minutes after injection. In cases of complete achylia from organic change in the gastric mucosa, no red color will appear. In cases of hyperchlorhydria, the dye appears as early as within 15 minutes, while in subacidity it may appear as late as after 45 minutes. (1)

The variations obtained in the secretion of hydrochloric acid in health and disease may be so great that it will not by itself enable us to diagnose disease with certainty. An exception to this fact is seen in Addisonian anemia, in which achlorhydria is almost always present. In its absence, the diagnosis of this disease is unjustifiable. In the great majority of cases of this anemia, histamine has no effect. This is in contradistinction to the anemia of sprue, in which achylia responds to histamine stimulation.

It would seem obvious, therefore, that diagnostic criteria based only on the results of gastric analysis may be inadequate. There are, however, some gastric charts which are suggestive, and sometimes characteristic, of certain diseases. The rising acidity and delayed emptying of the stomach in cases of ulcers situated near the pylorus, the typical charts of pyloric stenosis, and the curves in various conditions of anacidity and their differentiation by using modern technique, are all commonplace knowledge.

Lastly, with the use of histamine as a stimulus to gastric secretion, it is becoming of great importance to revise our views on the preexisting conditions of achylia. People who fail to secrete free acid after a test meal may now give a normal response after histamine stimulation. Thus, true anacidity is shown to be quite a rare condition. (1)

TESTS OF PANCREATIC EFFICIENCY

There are no standard units and no standard tests for estimation of such function. In chronic pancreatitis: (1) No tests are reliable; (2) feces examination indicating possible dysfunction record 25% fat and 1% neutral fat—undigested meat fibres. In acute pancreatitis Wohlgenarth diastase test is only 25% accurate. (Johnson) (8)

BILIARY DRAINAGE

Utilization of duodenal intubation with abstraction of overnight fasting duodenal residual bile for macroscopic and microscopic examination, plus the added expulsion from the gall bladder, under the stimulation of mag-

nesium sulphate (25%) instillation via duodenal tube of dark mahogany bile, if the ducts or gall bladder are unoccluded or blocked, constitutes a reliable index to their physiologic or pathologic status.

In the presence of obstruction of the ducts or the gall bladder, "B" (dark gall bladder bile) will not be obtained, yielding prima facie evidence of a non-functioning organ.

The presence of either cholesterin crystals and calcium bilirubinate pigment, alone, is indicative of cholelithiasis, and if concomitantly present, such is proof positive of this mal-condition.

Parisites or ova may be found, especially in the duodenal juice, as: uncinaria americana, or lambliae intestinalis (giardiasis).

Usually when cholesterin crystals and calcium bilirubinate pigment are found in combination or singly, Roentgenological evidence of gall stones is superfluous, as the diagnosis of cholelithiasis or cholesterosis is definitely established.

LIVER FUNCTION TESTS

The bromsulphalein, Van den Bergh, icterus index, galactose and levulose, blood phosphatase tests may all be used to determine impairment of hepatic function. Frequently several have to be used in the same case to determine the degree of involvement and progress of the disease and to differentiate between obstructive and hepato-cellular jaundice.

SIGMOIDOSCOPIC EXAMINATION

Is of use in determining mal-conditions of rectum and sigmoid, affords information not available by x-ray, and accords opportunity to make direct cultures.

EXAMINATION OF STOOLS

The collected feces should be free from urine, and the specimen should be subjected to the following: macroscopic, microscopic, in all cases, and chemical examinations.

Chemical analysis is important only for detecting occult blood in cases of ulceration or carcinoma of the alimentary tract. (1)

Various digestive disturbances are caused by ascaris and taenia; serious anemias by dibothriocephalus latus and ankylostomiasis, and dysenteries by amoebiesis and bilharziasis.

As to the amoebiasis in untreated cases of amoebic dysentery, the criterion by which a diagnosis can be made is by finding the living motile entamoeba histolytica in the stools.

RADIOGRAPHY

Radiography is of extreme importance, revealing pathologic conditions of gastro-intestinal and biliary tracts. Ulcer is usually manifested as a niche or addition to the outline of a viscus. Carcinoma is generally portrayed as a subtracation defect of visceral morphology.

Cholecystography, oral or intravenous, as a means of detecting disease of the gall bladder has proven to be of intestimable value.

A barium enema is of importance in determining the presence or absence of disease of the colon, whether ulcerative, or fungating, or exhibiting diverticulosis, zonal spasm or functional dyscrasia.

The fundamentals heretofore presented are but elementary, the basis of concept with which each and every gastroenterological problem must be viewed, and with adherence to such schemata, the door to their solution may be opened to our successful entrance.

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CERTAIN ASPECTS OF CALCIUM THERAPY*

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Medical literature in the past ten years has been filled with reports of factors influencing calcium metabolism and their therapeutic applications. The mere fact that substances are being used in such a wide variety of conditions, with such enthusiastic results leads conservative clinicians to feel that there is little rational basis for any practical application of these substances. Despite this, one must not lose sight of the fact that there is no doubt at the present time that calcium, the parathyroid

*Read before the New Castle County Medical Society, Wilmington, January 15, 1935.

hormone and vitamin D have very definite uses. I hope, in the time I spend here with you, to point out the rational basis of calcium therapy in practical medicine.

Because calcium is a normal constituent of the body we are apt to feel that calcium therapy should be applied only in conditions where there is calcium deficiency. There is no doubt that this is the general feeling among practitioners, but one must not lose sight of the fact that besides being a normal constituent of the body, calcium has certain well-defined pharmacological properties.

Therefore, calcium therapy may be divided into two fields. The first is specifically directed toward the correction of states of calcium deficiency. The second is that in which calcium is used for the purpose of producing a purely non-specific effect. These two groups must be very definitely kept sight of. A few statements should be made regarding the functions of calcium in the body. The formation of bone is one of the most obvious. One important fact which has been developed as a result of recent investigation in calcium metabolism is that the calcium deposit in the bones is of such a nature that calcium can be very readily withdrawn from the bones through the operation of certain processes. It is probably well to think of the calcium deposit in the bones as of glycogen stored in the liver, delivering glucose to the blood very readily. The same is true of the calcium phosphate deposit in the bones. We should consider it a readily available storehouse of calcium in the body. Another normal function of calcium is in connection with coagulation of the blood. Its place can be taken by other elements, but under normal conditions calcium is absolutely essential for coagulation.

Calcium is essential for the normal excitability of nerves and muscles, and to the normal contraction of the heart and the maintenance of the normal cardiac cycle. From a therapeutic standpoint its action seems to be similar to digitalis and, according to some pharmacologists, the two act synergistically.

Another very interesting action of calcium is that it modifies the actions of certain drugs. By altering the proportion of calcium in the fluid in which the experiment is being carried out, the action of cocaine can be reversed. The same has been shown with regard to the actions of several other drugs. This aspect of the pharmacology of calcium is receiving a great deal of attention at the present time. One action of calcium, which I want to mention particularly, is the one which I believe is responsible for the effect of calcium in a great many cases in which it is applied as a non-specific agent, namely, its effect upon the permeability of membranes. Calcium diminishes the diffusibility of substances through membranes. That knowledge was not applied very definitely clinically until comparatively recently. Even now, it is not generally appreciated that the effect of calcium therapy in a great many conditions results from its action in diminishing the permeability of cell membranes. Experimentally, several methods have been employed to demonstrate this action of calcium. Place a slice of red-beet root in ordinary tap water. The pigment remains in the cell. But take the same beet root and put it in a solution of 1.8% sodium chloride and the pigment diffuses out, the salt solution becoming red and beet root light. The addition to the solution of a small quantity of calcium will neutralize this effect of the sodium chloride and the pigment will not diffuse out of the beet root. The action of calcium is to inhibit the passage of this pigment through the cell wall. This illustrates the tremendous effect which calcium has on certain vital processes. Most of the cell membranes of the body are impermeable to most substances in the resting state. There are only a few substances which can pass through a cell membrane under certain conditions, namely, alcohol, ammonium salts, and urea. However, if cells are to function, many substances must pass in and many have to pass out. The varying permeability of a cell membrane under conditions of normal function is probably dependent to a large extent upon changes in the ratio between sodium and potassium in the fluid bathing of the cells.

A few words with regard to the requirement of calcium. It has been known for a long time that the average American adult diet has an extremely low calcium content, due chiefly to its very low content of dairy prod-

ucts. According to Sherman and most investigators, it is far below the average adult requirement. Sherman believes that the average diet should contain one gram of calcium in every twenty-four hours. The average American diet contains less than one-half of that. Sherman has shown that although animals may apparently grow normally, if their diet contains an abundance of calcium, they reach maturity sooner and their period of normal maturity is prolonged. I think the facts that Sherman has developed indicate very thoroughly that one of the features of our diet which is sadly in need of correction is that of its calcium content.

The normal calcium content of the blood is from nine to eleven mgm. per 100 c. c. This consists essentially of two components, one termed diffusible and the other non-diffusible, according to whether it can or cannot pass through the cell wall. Approximately half of the calcium can get out of the blood and one-half cannot. The half that cannot is believed to be combined with proteins in some way, preventing its diffusion through the capillary walls into the tissues.

There are two important factors which must be considered in connection with calcium therapy. One is vitamin D, and the other parathyroid hormone. Although the mode of action of vitamin D is not definitely known, we do know a great deal about it. Vitamin D, when administered to any animal increases the serum phosphorus. It also increases the serum calcium and causes retention of calcium and phosphorus in the body. If one administers vitamin D continuously, one finds that the animal passes into a state of positive calcium and phosphorus balance. No definite conclusion as yet has been reached about the exact manner in which vitamin D produces these effects but the general belief is that it either increases the absorption of calcium and phosphorus from the intestines or increases its utilization in the tissues. Parathyroid hormone decreases the serum phosphorus, increases the serum calcium and causes increased elimination of calcium and phosphorus from the body, particularly the latter. You can see very readily from the physiologic standpoint that the action of vitamin D and parathyroid hormone are alike in only one respect, in that they increase the serum calcium. This one point of similarity has lead a great many practitioners to employ them more or less indiscriminately in conditions in which one may be indicated and the other contra-indicated. The parathyroid hormone probably acts by increasing the elimination of bone calcium and phosphorus from the bones and, in my opinion, the point of attack of the two substances is entirely different. In very few conditions are both indicated.

Tetany is the characteristic manifestation of calcium deficiency. Deficiency in vitamin D most commonly occurs in infants and its most important clinical manifestation is rickets, which is typically associated with a decrease in the serum phosphorus. The serum calcium may remain normal for a long time in rickets. When the condition of vitamin D deficiency progresses to the point where the serum calcium is diminished rickets becomes complicated by infantile tetany. This is one indication for a form of specific calcium therapy, namely, vitamin D. The administration of calcium salts or parathyroid hormone will relieve the tetany in many instances but will not relieve the underlying condition; parathyroid hormone in fact, may do harm. The latter will not produce the same effect as vitamin D; it may produce physiologic changes which are exactly the opposite of those you desire. Primary parathyroid deficiency is relatively rare. Juvenile tetany, which may be of parathyroid origin, is not very common and infantile tetany is usually due to vitamin D deficiency. An individual with tetany of parathyroid origin has characteristically an increase in the serum phosphorus, whereas, tetany due to vitamin D deficiency is associated with a decrease in serum phosphorus. If one studies the calcium and phosphorus balance, which is not ordinarily done, one finds that in tetany due to vitamin D deficiency the individual is losing calcium and phosphorus and in parathyroid deficiency he is gaining calcium and phosphorus. This indicates, I believe, the importance of determining the serum phosphorus in such cases. The serum calcium should never be determined without

the serum phosphorus since the former, in itself, may be deceptive.

There are a great many conditions other than tetany in which calcium therapy is employed. Some of those have a very definite basis, a great many do not. There are some that I should class as semi-specific, in which some authorities believe specific indications exist and others are doubtful. At the head of this list I would place pregnancy. Up until ten years ago pregnancy was studied intensively from the standpoint of changes in organic metabolism, and certain very definite changes were shown to occur. Recently, more striking changes have been shown to occur in calcium and phosphorus metabolism. It has been shown, for example, that during pregnancy the mother retains tremendous amounts of calcium; as the pregnancy progresses more and more calcium and phosphorus are retained in the body. Abruptly, with the termination of pregnancy and the institution of lactation, tremendous quantities are poured out of the body, the state of marked positive balance changing to one of very pronounced negative balance. Part of this loss occurs in the milk, but not all can be accounted for in this way; more calcium has been found in some cases in the feces than has been ingested during lactation. The reason for this is not known exactly. We know that the mother has to retain a certain amount of calcium in order to satisfy the requirements of the foetus and that these requirements are rather high. At the twenty-eighth week of pregnancy the foetus contains about five and one-half grams of calcium; at the thirtieth week the foetus contains over 45 grams, draining from the mother an average of 0.1 grams of calcium a day. If the mother is taking an average American diet, which in itself is less than the average non-pregnant woman needs, if the foetus is to receive its adequate calcium supply the mother is being drained of excessive quantities of calcium. I think one of the greatest advances in the maintenance of normal nutrition during pregnancy, has developed out of the recognition of this fact. During pregnancy, the woman needs a much greater supply of calcium than during the non-pregnant state. One of the most notable diseases which occurs as a result of this is osteomalacia which is not seen very much in this country. This has been recognized as being essentially adult rickets. It occurs particularly during pregnancy because the calcium requirement of the woman is much greater than the normal adult requirement. Osteomalacia should be capable of eradication, just as rickets should be capable of eradication. Other symptoms that occur during pregnancy have been attributed to a state of calcium deficiency. Emotional and physical irritability, muscular spasms, cramp-like pains and other symptoms have been attributed to a state of mild calcium deficiency. The condition of the teeth during pregnancy has been attributed to a state of mild or severe calcium deficiency but there is a great deal of discussion at the present time as to whether or not adult teeth can be affected in this way. However, I believe it good practice to employ calcium therapy routinely during the latter months of pregnancy.

Another condition in which semi-specific disturbances of calcium metabolism exists is hyperthyroidism. There may be marked demineralization of bones and, if one studies the calcium balance, one finds that the output of calcium is greatly in excess of the intake. That is not purely the result of an increased metabolic rate. Experimentally, exophthalmic goiter has been produced in animals maintained on a low iodine, high calcium diet. The calcium seems to increase the effect of iodine sufficiency. It is very difficult on this basis to see why the administration of calcium would do good in cases of hyperthyroidism but enthusiastic reports have appeared in the literature regarding the beneficial effect of calcium therapy in patients with hyperthyroidism. My advice would be that it should not be employed, at least until we know more about it.

Another point, which has been brought out by Joslin, is that diabetes mellitus, particularly in children, is almost regularly associated with a calcium loss in the body. The output of calcium is greatly in excess of the intake. Their diet is usually low in calcium and is particularly below the requirement of a child during the period of active growth. It

has been shown that diabetes in children, particularly if it is not well controlled, is almost regularly associated with rarefaction of bones, in some cases with spontaneous fractures and particularly with dental disturbances. There is some doubt as to whether changes in calcium metabolism can affect the teeth in adults. There is not much doubt as to whether it can change the growth of the deciduous teeth but after the permanent teeth are fully calcified there is some doubt as to whether changes in calcium metabolism will change their structure. Joslin has shown that the administration of a high calcium diet, to children particularly, rapidly restores the normal dental condition and corrects many errors which previously resisted treatment. I have hinted at the question of dental caries. The problem of dental caries is one of the most important health problems in children today, and we are not much nearer the solution today than we were several years ago. There are just as many theories and they are just as diametrically opposed today as they were a few years ago. However, I think that in children particularly, with dental caries and tendency toward softness of the teeth, the administration of calcium should be made a matter of routine. In some cases it has remarkably improved the condition of the teeth.

There are some non-specific conditions that are associated with no demonstrable disturbances of calcium metabolism. First of all, lead poisoning. Lead poisoning is one of the most important of the industrial hazards. Our treatment at the present time has been placed upon a rather secure basis. The metabolism of lead in the body resembles that of calcium. The storage of calcium will cause a storage of lead in the bones and removal of calcium will remove lead. During the stage of acute toxemia, in which excessive amounts of lead are circulating in the blood, an effort should be made to remove lead from the blood and store it in the bones. The storage of lead in the bones can be hastened by the administration of calcium and phosphorus. High calcium diets and the administration of calcium salts should be employed. After the toxic symptoms have subsided one can remove the lead from the bones by removing the calcium from the bones. Parathyroid hormone is the agent which has been found to be most effective. After a period of time most of the lead can be removed in this way. Others are ammonius chloride and similar substances that produce acidosis. Also, due to its antispasmodic effect, calcium will relieve gall bladder colic and ureteral colic. Patients with lead colic can be relieved almost miraculously before the injection of calcium is completed. The colic subsides sometimes before ten c. c. of calcium have been injected intravenously. If it is not relieved by calcium it is probably not lead colic.

Calcium has also been used in allergic disorders, as in skin disorders of the moist type, particularly those which follow the administration of drugs, such as luminal. The treatment of asthma by the use of calcium has been very severely attacked by many men because no evidence of calcium deficiency has been demonstrated. I hope that you appreciate the fact that this objection is not a valid one. From a clinical standpoint, a great many patients are relieved. I think the administration of calcium in allergic conditions is certainly worth a trial.

Calcium therapy is particularly desirable in hepatic diseases and in jaundice. It has been shown that in acute diseases of the liver, and the acute forms of hepatitis produced by certain drugs, there is an increased concentration of guanidine in the blood. Before parathyroid hormone was discovered it was believed by many that tetany was due to an excess of guanidine in the blood. Guanidine produces symptoms which are much like those of calcium deficiency, and which can be combatted by the administration of calcium. Minot and Cutler found that dogs to whom carbon tetrachloride was administered, would die within forty-eight hours with symptoms identical with those of guanidine intoxication. They found that if bones were included in the diet the dogs would not die and would apparently get along well with doses of carbon tetrachloride far in excess of those given to the other dogs. The development of these symptoms could be controlled by calcium and calcium checked the symptoms after they had developed. Out of this observation developed

the idea of calcium therapy in patients with acute hepatic lesions; such patients die not so much because of the liver lesion as because of the associated toxemia. The liver regenerates very rapidly and, if they can be tided over the period of acute toxemia, which can be accomplished experimentally by calcium therapy, they may recover completely. I believe that in all patients with acute hepatic lesions calcium should be administered more to prevent these manifestations than anything else.

In the administration of calcium I believe that the best salt to employ is calcium gluconate. It is useless to give it in the ordinary pharmacopeial dosage. One finds that calcium is still being prescribed in doses of five, ten, fifteen and twenty grains after meals. You might just as well throw it out the window. Calcium gluconate is given in doses of one teaspoonful three times a day, before meals, or three to four hours after a meal, since calcium is least absorbed when the alkalinity of the duodenum is highest. Regardless of what type of calcium therapy you are employing, given by mouth it will have to be given before the meal. Calcium levulinate is given in doses of 40 grains, and calcium chloride, more irritating but most effective, 30 grains; these can also be given intravenously. The gluconate and levulinate can be given intramuscularly. If you give ten c. c. (10-20% solution) it is probably better to give it in two different areas. I think it is not wise to give ten c. c. all in one spot. Parathyroid hormone can be given in doses of thirty to forty units at one injection, and should not be repeated more than once in every twenty-four hours. Parathyroid therapy is not commonly employed over a long period of time, except in patients with parathyroid tetany.

THE COSTS OF PRESCRIPTIONS AND PROPRIETARY DRUGS

GEORGE J. BOINES, M. D.
Wilmington, Del.

This paper is offered with the idea of bringing to your attention the average cost of the ordinary prescription, and to outline briefly the difference in price between the well-advertised proprietary drug and the same drug sold as a chemical.

It is natural that the druggist expects a certain profit on the prescriptions that he fills; in cases where the drug is not in popular demand and the druggist must buy a larger quantity than the prescription calls for, then the cost of the prescription will be higher; for this reason if the drug would be ordered in the same quantity as the druggist has to buy it, then the cost to the patient will be much less for the amount of medicine he receives.

The prices which drug stores charge for ordinary prescriptions are more or less uniform. Usually the larger the quantity of the drug the cheaper it is in proportion. The usual charges on regular prescriptions are as follows:

Liquids		Ointments	
One oz.	$ .25	Half oz.	$ .35
Two oz.	.45	One oz.	.50
Three oz.	.60	Two oz.	.75
Four oz.	.75		
Six oz.	1.00	**Capsules or Powders**	
Eight oz.	1.25	Twelve	$ .50
Pills		Eighteen	.65
Twenty-four	$ .60	Twenty-four	.75
Thirty	.75	Thirty	.90

From this list it is evident that where renewal of the prescription is anticipated it will be cheaper for the patient to get the larger quantity with the original prescription.

It is a matter of everyday occurrence where a doctor tells his patient that the prescription should cost so much, but when the drug store is reached the price is much higher, not because the druggist overcharges but because the preparation ordered is more expensive than the physician imagined. During prosperous times patients would register no complaints about the costs of medicines, especially when special trade marks and fancy names are prescribed. Of late years, however, when cash has become less abundant patients have to figure closely, because in many cases after the medicine is bought there is nothing left for the fees of the charitable M. D.

On the list prices stated below, the druggist usually adds 25% to 50% for filling a prescription of any kind.

Below follows a list of some of the commonly prescribed preparations and the prices as of June 1, 1935, that the druggist pays to the wholesaler:

U. S. P. PREPARATIONS

Syr. Hydriodic Acid (Lilly)	16 oz.	$ .78
Elix. Lactated Pepsin (Lilly)	16 oz.	.60

(Concluded on Page 156)

EDITORIAL

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A SURPRISING CHARGE

In a charge to a grand jury Federal Judge George W. McClintic, of West Virginia, said that bridge-playing nurses were responsible for patients becoming drug addicts. In their enthusiasm for the game and their dislike of stopping in the middle of a rubber to attend a call to the sick room, nurses, the judge said, adopted the efficacious method of doping their charges.

In Dickens' day, nursing was given over largely to the Sairey Gamps and Betsy Prigs. Those estimable ladies, being much addicted to gin and cowcumbers, were worse to combat than the most virulent diseases. "A mustard poultice on your back" was one of Sairey's sovereign remedies for whatever ailment, accompanied by some such admonition as that "if you should turn at all faint, we can soon revive you, I promise you. Bite a person's thumbs, or turn their fingers the wrong way and they come to wonderful, Lord bless you." But it would be surprising, indeed, if the prototypes of these guardians of the sick room survived to these times.

Bridge has its lure and the statement of a member of the Federal bench is not to be lightly taken. But the charge brought against West Virginia hospitals is so shocking as to be difficult of belief. It has been given such wide publicity, however, that in justice to these institutions and to the nursing profession, the allegations should not be permitted to pass without answer.

—Editorial, *Baltimore Sun*, June 29, 1935.

"The allegations should not be permitted to pass without answer," nor will they be, for in due time the hospitals of West Virginia can be counted upon to demonstrate satisfactorily that they—in common with the hospitals of all the other States—do not make drug addicts of their patients.

The United States judges have perhaps established an "all-time high" record for fidelity to duty. If our memory serves us correctly, in the 146 years since the Federal courts were established, only six Federal judges have been impeached: of these, three were acquitted, one was found guilty, one resigned, and one committed suicide. Three of these impeachments came during the staging of our national farce-comedy entitled "Prohibition." Presumably, then, there were only three derelict Federal judges in 146 years—and that is a record for any profession to be proud of.

No man who shoulders the responsibilities of a Federal judgeship speaks flippantly when charging a grand jury, so one must assume that the West Virginia jurist has unearthed a case that warrants investigation. However, even if the instant case should prove to be as alleged, it would represent in the American hospital world as rare and as sporadic an instance of dereliction of nurses as is cited above in the rarity of dereliction of Federal judges. We, who from daily contact know hospitals from the inside out, know that "doping their charges" is just about the least of their shortcomings, and should one isolated instance of such a conscienceless thing be proven (and we hope punished), the unexampled efficacy and service of the American hospital will still stand unchallenged. When it comes to charity, utility, or fidelity, we defy Judge McClintic—we defy the world—to prove that the American hospital takes second place to *any* institution, be it legal, lay, or what-not.

The annual outing of the New Castle County Medical Society was held at Farnhurst on June 18th. The inclement weather drove the medicos indoors; nevertheless, a most enjoyable afternoon of games and dinner was spent. The Society takes this opportunity to thank those who donated the prizes, cigars, etc.

The State medical licenses, previously obsulted as follows: regulars, seven passed, three failed; homeopaths, 6 passed, 2 failed; osteopaths, 1 passed, 3 failed; total, 14 passed, 8 failed.

The State medical licenses, previously obtained from the Clerk of the Court in each county, can now be obtained only from the State Tax Department. The 1935 application blanks have to be sworn to. This is a new wrinkle, and to our mind, a ridiculous one, at least so far as concerns the licensed professions. When one is required to swear that he was duly licensed *last* year, he is in effect, swearing to the records of the State of Delaware. Surely, the State of Delaware has accurate records of its licenses, and it *is* ridiculous to ask the citizens to prove to the State that they were entitled to and received what the State itself gave them—their license. If we have to go through the same tomfoolery next year, we won't swear *to* the blank—we'll simply swear *at* it, and say to the Commissioner: "You ought to know."

The Costs of Prescriptions and Proprietary Drugs

(Continued from Page 154)

Iron, Quinine and Strychnine (Lilly)	16 oz.	.60
Morph. Sulph. gr. ⅛ 100 tab. (Hypo) (Lilly)		1.26
Morph. Sulph. gr. ⅛ 100 tab. (by mouth) (Lilly)		.96
Sodium Bromide tab. 100 (Lilly)		.36
Sodium Bromide tab. 1000 (Lilly)		2.43
Bromide Efferv. Diskets 25 (Lilly)		.43
Tinct. Digitalis, fat free, one oz. (Lilly)		.36
Sodium Bicarbonate (Merck)	4 oz.	.05
	8 oz.	.10
Potassium Citrate (Merck)	4 oz.	.28
	8 oz.	.40

PROPRIETARY PREPARATIONS

Syr. Hydriodic Acid (Gardner)	16 oz.	$1.40
Elix. Lactopeptin (Reed)	16 oz.	1.25
Metatone (P., D. & Co.)	12 oz.	.92
Incretone (Carnick)	6 oz.	1.00
Elix. Arsilen Comp. (Roche)	6 oz.	.75
Pantopon (Roche) gr. 1/6 100 tab.		3.75
Dilaudid (Merck) gr. 1/16 100 tab.		4.00
Allanol (Roche) 12 tab.		.67
Peralga (S. & G.) 12 tab.		.63
Ipral (Squibb) 10 tab.		.35
Sedormid (Roche) 10 tab. 2 gr. each		.40
Medinal (S. & G.) 12 tab.		.45
Bromide Efferv. (B. & W.) 25 lozenges		.72
Elix. Medinal (S. & G.)	6 oz.	1.00
Elix. Ipral (Squibb)	16 oz.	2.20
Sodium Amytal (Lilly) 40 3 gr. caps.		2.00
Digitalone (P., D. & Co.)	1 oz.	.51
Digalen (Roche)	1 oz.	.90
Diditol (Mulford)	1 oz.	.63
Digifortis (Ciba)	1 oz.	.96
Citrocarbonate (Upjohn)	4 oz.	.67
Citrocarbonate (Upjohn)	8 oz.	1.00
Bisodol (Bisodol Co.)	4 oz.	.57
Bisodol (Bisodol Co.)	8 oz.	1.05

The usual prescription charge for sedative tablets or capsules is ten cents per tablet or capsule, especially when less than ten or twelve are ordered.

For comparing the prices of proprietary drugs with the preparations of the same chemical composition or of the same chemical nature the following table is presented, giving the proprietary name and the manufacturer, with the prices for the quantity stated. The prices were obtained from the Sixth Edition (1934-35) of the American Druggist Price Book.

Proprietary name and Manufacturer	Quantity	List Price
Aristol (Winthrop)	1 oz.	$1.80
Vince (Warner)	1 lb.	1.40
Veronal (Winthrop)	1 oz.	3.00
" 5 gr. tab.	10	.40
" 5 gr. tab.	100	3.60
Trional (Winthrop)	1 oz.	1.90
Sulphonal (Win.)	1 oz.	1.70
Luminal (Winthrop)	½ oz.	3.45
" (Winthrop)	1 oz.	6.25
" ¼ gr. tab.	100	.63
" ¼ gr. tab.	1000	6.00
" ½ gr. tab.	100	1.25
" ½ gr. tab.	1000	11.87
" 1½ gr. tab.	50	1.25
" 1½ gr. tab.	1000	24.40
" Elixir	4 oz.	.75
" Elixir	12 oz.	2.00
Urotropin (Schering)		
" 5 gr. tab.	50	.45
" 5 gr. tab.	100	.85
" 5 gr. tab.	500	4.00
" 7½ gr. tab.	20	.30
" 7½ gr. tab.	500	6.00
Theocin (Winthrop)	½ oz.	2.82
Diuretin (Bilhuber)	1 oz.	1.50
Metaphylin (Hurst) (66% Theophylin)	1 oz.	8.45
1½ gr. tab.	40	1.50
Aspirin (Bayer)	1 oz.	.85
" 5 gr. tab.	100	.55
" 5 gr. tab.	1000	5.50
Atophan (Schering)	1 oz.	2.75
" 5 gr. tab.	100	2.40
" 7½ gr. tab.	20	1.00
" 7½ gr. tab.	100	4.00
Neo-Cinchophen 5 gr. (Amer. Pharm. Co.)	100	.75
	100	2.00
7½ gr. tab.	20	.64
	100	2.65
Phenacetin (Winthrop)	1 oz.	.63
Pyramidon (Metz)	1 oz.	.82
" 5 gr. tab.	100	1.75
" Elixir	16 oz.	3.00
Silver Preparations (10 to 25% Ag.)		
Lunargen (Lilly)	1 oz.	.95
Argyrol (Zonite Sales)	1 oz.	1.50
Neo-Silvol (P. & D.)	1 oz.	1.50
Silvol (P. & D.)	1 oz.	1.02
Protargol (Winthrop)	1 oz.	1.25

Chemical name or Composition.	Price
Thymol Iodide (Merck)	$.44
Sod. Perborate (Merck)	.38
Barbital (Merck)	.59
" "	.16
" "	.85
Sulphonethylmethane (Merck)	.72
Sulphonmethane (M)	.59
Phenobarbital (Merck)	.38
" "	.68
" (Lilly)	.21
" "	.90
" "	.25
" "	1.59
" "	.25
" "	3.40
" "	.34
" "	.66
Methenamine (Merck)	.28
" "	.45
" "	1.65
" "	.18
" "	2.10
Theobromine (M) 1 oz.	.35
Theobromine Sodium acetate (Merck)	.38
Theophylline (Merck)	2.21
Theobromine Sodium Salicylate (46% Theo)	.29
Theamin (Lilly) (82.5% Theo) capsules	.85
Acetyl salicyclic acid (Merck)	.15
Acetyl salicyclic acid (Lilly)	.26
Acetyl salicyclic acid (Lilly)	1.65
Cinchophen (U. S. P. (Merck)	.35
Cinchophen (Lilly)	.64
" "	.30
" "	.85
Acet-Phentedin (M)	.21
Amidopyrin (Merck)	.46
" (Lilly)	.87
" "	1.59
Silver Protein Mild (Silver Nucleinate) (U. S. P. Merck)	.52
Silver Protein Strong (Silver Proteinate) (7½ to 8½% of Ag.)	.51

The brief list of prices outlined above is sufficient to emphasize the necessity of investigating the costs of drugs before they are prescribed.

MISCELLANEOUS

Policies Adopted By the House of Delegates

The annual session of the American Medical Association held in Atlantic City, June 10 to 14, was extraordinary from the point of view of its contributions to the advancement of medical science and as a demonstration of a well-nigh perfectly organized meeting. Letters are pouring into the headquarters office expressing commendation of the Scientific Exhibit and of the lectures presented in the General Scientific Meetings.

The House of Delegates functioned efficiently and completed its business with such celerity that many observers commented on the apparent quiet of the proceedings. This was no doubt due to the fact that the reference committees were so well selected and so assiduous in the performance of their duties that most difficulties were ironed out in the committees. Many listened for hours to those representing various points of view, and the reports which they brought in took cognizance of these expressions and were therefore adopted without opposition from the floor.

In THE JOURNAL, June 22, appeared the reports of the first session of the House of Delegates, wherein resolutions were introduced on radio broadcasting, contraception, medical care and the teaching of medical economics. The House of Delegates encouraged the Board of Trustees to do its utmost to control the broadcasting of fraudulent claims for pharmaceutic preparations and to eliminate the broadcasting of claims for alleged cancer cures from Mexico. By the action of the House of Delegates the Board of Trustees was authorized to appoint a committee to study problems concerned in contraception and to present a preliminary report to the House of Delegates at the 1936 session. The chairman of the Legislative Committee described in his report, which appears in this issue of THE JOURNAL, the manner in which the Association has co-operated with the American Legion and the Veterans' Bureau in relationship to medical problems affecting these groups. He described also the steps that have been taken to bring various medical organizations into accord with the policies of the American Medical Association relating to economic problems. The Bureau of Medical Economics, pursuant to the action taken at the special session of the House of Delegates held in Chicago in February, presented at this time a report on more than two hundred plans now in operation in various parts of the country in an attempt to provide all the people with adequate medical care. This report of the Bureau, with various modifications, was adopted by the House of Delegates and will appear in an early issue of THE JOURNAL.

The actions of the House of Delegates as reported in last week's issue and in this issue of THE JOURNAL are given in considerable detail. It is desirable that all those who are interested in the policies of the American Medical Association make a thorough study of these reports and familiarize themselves with the problems concerned. Only to the extent to which all the membership of the Association is familiar with these activities and supports them can the Association function efficiently. —*Jour A. M. A.*, June 29, 1935.

Integration of the Medical Profession

Recently there was introduced and passed in the legislature of the state of Oklahoma a statute integrating the dental profession. In the legal profession the movement toward integration has been under way for some years. Apparently there are movements afoot both in Oregon and in South Dakota for integration of the medical profession. This term implies the organization by statute of all licensed practitioners of medicine within a state into a public corporation, which corporation is authorized by law to determine the professional fitness of those who seek admittance into the profession in that state. The corporation would also be authorized to supervise and regulate the professional activities of every member of the profession. Thus it would determine who is and who is not eligible for admission, supervise the conduct of members, and reprimand, suspend or remove them when circumstances indicate the desirability of such action. Of course a member expelled from a corporation would thereby cease to be authorized to practice medicine. In such an integrated profession, every licensed prac-

titioner would be entitled to vote for the managers of the corporation and would also be assessed for the cost of its management. An integrated medical profession would therefore take over the activities of medical examining and licensing boards. The movement would not apparently have great popularity among physicians, who are, of course, on a different basis than either dentists or lawyers, because of the cultists of various types who enter into the practice of medicine and because of the strength and usefulness of voluntary medical organizations. Certainly until the situation has been much more extensively studied and all the possibilities worked out, the medical profession will do well to avoid being drawn into any such movement.—*Jour. A. M. A.*, June 29, 1935.

A Cancer Clue

For the first time we see a spark of hope as to the cause of cancer. Dr. J. W. Cook of the Research Institute of the Cancer Hospital of Lindon has discovered a new clue to the cause of cancer—a chemical cause, which the *Druggists' Circular*, Feb., 1935, reports Dr. Francis Carter Wood, eminent New York cancer specialist, as saying "as important to the field of cancer as the discovery of the tubercle baccilus by Dr. Robert Koch in 1882 was to tuberculosis."

Dr. Cook's working theory was that there might exist in the human body harmless substances necessary to life but which become perverted and changed into cancer-producing substances for some reason. He took a bile acid normally produced by the body and subjected it to the processes similar to those which occur in the body, such as dehydration, oxidation, dehydrogenation and the removal of carbon dioxide.

"According to Dr. Cook, after the original bile acid, deoxycholic acid, was subjected to such processes, it was found to have changed into a hydro-carbon which was called methycholanthrene. When this was applied to laboratory mice, it is said to produce cancer. Dr. Cook reported the substances to be 5:6 dimethyl—1:2 benzanthraquinone."

According to *Druggists' Circular*, Dr. Wood said: "The discovery that a chemical substance found in the body can be changed into a cancer-producing substance gives us a key to the chemical nature of cancer. We have definite grounds for believing that some perversion of the normal processes in the body by making a slight change in the chemical structure of a health-giving sterol molecule may transform it into another substance that produces cancer. If we find out what causes this perversion, a way may be opened to find means for preventing it."

Druggists' Circular further reports recent correspondence with Dr. Wood: "We do not know as yet whether the transformation of deoxycholic acid into methylcholanthrene actually does occur in the body or not. All we know is that the chemical transformation was accomplished as stated by relatively simple processes which can occur in the body as they go on at temperatures not higher than 37° C. Hitherto all of the cancer-producing chemicals have been produced by distillation at high temperatures of a great variety of organic substances. This is the first instance in which a cancer-producing substance has been obtained by low temperature procedures."

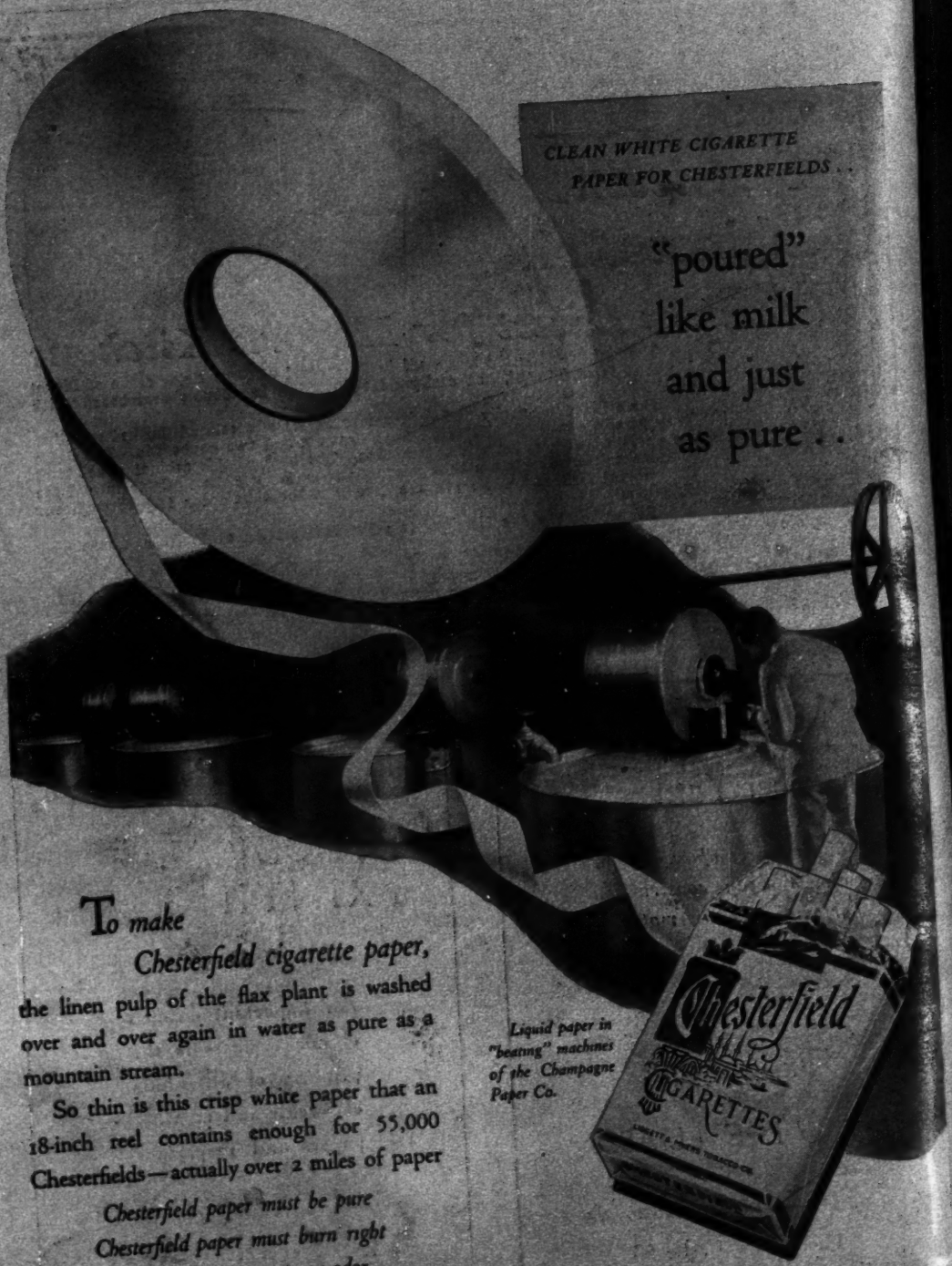
We shall await further experiments with keen interest.—Editorial, *R. I. M. J.*

St. Francis Hospital Staff

At the annual meeting of the Ex-Presidents' Association of the St. Francis Hospital the following officers were elected for the coming year: Dr. Morris Harwitz, president; Dr. Sidney Stat, vice-president; Dr. Petronio Alava, treasurer; Dr. Minna H. Sosnov, secretary. The outgoing president is Dr. George J. Boines.

Notice

It is the desire of The Journal to keep its directory page positively up to date and accurate. The various societies listed there elect their officers at different times during the year. The Journal would appreciate being informed promptly of any changes that should be made to keep the directory up to the minute.



Liquid paper in "beating" machines of the Champagne Paper Co.

To *make*
Chesterfield cigarette paper,
the linen pulp of the flax plant is washed over and over again in water as pure as a mountain stream.

So thin is this crisp white paper that an 18-inch reel contains enough for 55,000 Chesterfields—actually over 2 miles of paper

Chesterfield paper must be pure
Chesterfield paper must burn right
It must have no taste or odor

—the cigarette that's MILDER
—the cigarette that TASTES BETTER